

Chewing gum practice among dental students

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ABSTRACT

Background: Oral health is an essential component of general health and overall well-being of an individual. Oral cavity and its surrounding structures that are free of any diseases are indicative of good oral health. Chewing gum increases salivary flow, raises the pH of plaque and saliva, reduces oral malodor, and is effective for stain removal. Sugar-free gums are simple, inexpensive, and are readily available. **Aim:** This study aims to evaluate the chewing gum practice among dental students. **Materials and Methods:** The study group comprises 100 individuals in the age group of 17–26 from both genders. A questionnaire is pertaining to chewing gum practice among dental students. The age and gender are noted along with the type of chewing gums used, frequency and duration are also taken into account. **Results:** It was found that 50% of population used sugar free and other used non-sugar-free chewing gums, and the frequency was found to be 20% of people used once a day, 40% used twice, and 40% used more than thrice a day with duration of 20% of the people chewed for 2 min, 40% for 2–5 min, 20% for 5–10 min, and 20% for >10 min. **Conclusion:** The practice of chewing gum among dental students is moderately prevalent and no preference was observed between sugar-free and non-sugar-free chewing.

KEY WORDS: Cariogenic, Chewing gum, Dental plaque, Remineralization

INTRODUCTION

The use of non-food items for pleasure has a long history. Tree resins were chewed by the Mayan Indians, the ancient Egyptians, and the early American Indians. The first commercial chewing gum, State of Maine Pure Spruce Gum, appeared in 1848. Interestingly, the first patent for a chewing gum was issued to a dentist, Dr. W. F. Semple, Mount Vernon, Ohio, in 1869. There are not any reliable worldwide sales figures for chewing gum. There is no doubt that chewing gum is a vital thing in confectionery which may be expected to have an influence on dental health. Chewing gum was initially made sweet by adding sugar, which contributed to dental caries. Today, however, >50% of chewing gum sold is sweetened with sugar substitutes (polyols). Clinical proof shows that sugar-substituted chewing gum does not cause dental caries, because the polyols do not cause a clinically relevant production of metabolic acids in dental plaque. At the same time,

however, gum chewing stimulates the flow of saliva, thus strengthening its protective properties, that is, its buffering capacity, mineral supersaturation, and cleansing, antimicrobial, and agglutinating actions. Clearly, this gives a beneficial effect from the chewing of sugar-free gum.

MATERIALS AND METHODS

The study group comprises 100 individuals in the age group of 17–26 from both genders. A questionnaire is pertaining to chewing gum practice among dental students. The age and gender are noted along with the type of chewing gums used, frequency and duration are also taken into account.

RESULTS

It was found that 50% of population used sugar free and other used non-sugar-free chewing gums, and the frequency was found to be 20% of people used once a day, 40% used twice, and 40% used more than thrice a day with duration of 20% of the people chewed for 2 min, 40% for 2–5 min, 20% for 5–10 min, and 20% for >10 min [Figure 1].

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Website: jprsolutions.info

ISSN: 0975-7619

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Received on: 19-08-2018; Revised on: 16-09-2018; Accepted on: 24-10-2018

DISCUSSION

Effects of Chewing Gum Based on the Physical Properties of the Product

Chewing gum has been claimed to:

1. Remove food debris and plaque from teeth^[1]
2. Stimulate saliva flow^[2] and there by
3. Raise plaque pH^[3]
4. Stop demineralization/promote remineralization^[4]
5. Reduce gingivitis,^[5] and
6. Possibly have an adverse effect on the temporomandibular joint.^[6]

Effects of Chewing Gum Based on Ingredients

The physical properties of the gum base involved in the effects of chewing gum described so far are characteristic of chewing gum in general. Based on different ingredients, one can, however, distinguish two product categories having different potential benefits. On the one hand, there are the so-called “fun and pleasure gums” - sugar based or sugar free, and on the other hand, there are products that, in analogy to the modern term “functional food,” might be called “functional chewing gums” such as medicated chewing gums or chewing gums containing ingredients claimed to be healthy for one reason or the other.

“Fun and Pleasure” Chewing Gum

Sugar-containing chewing gum and dental health of saliva

Many researches were made by many people and hence have proved that the use of sugar-containing chewing gum lowers plaque pH and increases the amount of plaque, and habitual use increases caries.^[7-11]

Sugar-substituted chewing gum and dental health

Sugar-substituted or sugar-free chewing gum is produced by replacing sucrose and other readily fermentable carbohydrates by sugar alcohols, also called glycitols, polyalcohols, or polyols. The most widely used sugar substitutes are sorbitol, mannitol, xylitol, maltitol, lactitol, hydrogenated starch hydrolysate, and isomalt. All these polyalcohols have been proven to be non-cariogenic or extremely poorly cariogenic in rat caries experimentation and some of them also in human clinical caries studies. They have also all been shown, by plaque pH telemetry, to be non-acidogenic or hypoacidogenic.^[12]

Functional Chewing Gum

Medicinal chewing gum

The advantages of chewing gum as a carrier for drugs are obvious: Chewing gum can be used without water, at any time, and everywhere. Product stability is good, because the incorporated therapeutic agents are protected from oxygen, light, and water. Chewing gum can produce both local effects in the mouth (local delivery), and systemic effects after the active agents have been swallowed or (preferably) after they have been absorbed through the oral mucosa. The latter is of special interest with respect to bioavailability, since it avoids metabolism of the drug in the gastrointestinal tract and the so-called liver first-pass effect, because oral veins drain into the vena cava. Examples of the use of medicinal chewing gum for local delivery of therapeutic agents are gums containing sulfonamides against infections of the oral cavity and adjacent regions (tonsillitis and pharyngitis), neomycin-gramicidin as analgesic and antibiotic agents, and miconazole and nystatin to fight candidiasis.^[13] More recently, alternative medicine has prompted

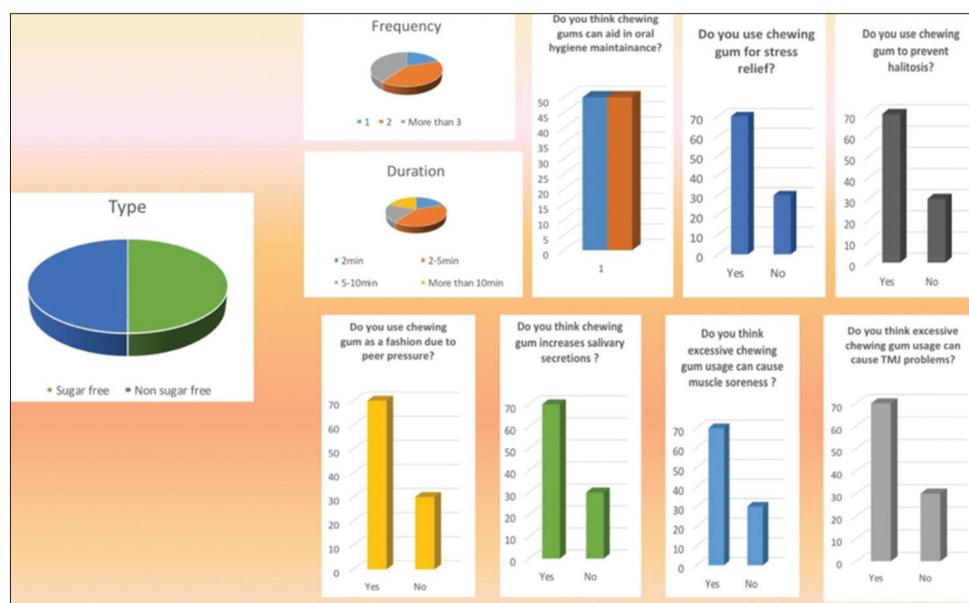


Figure 1: Survey of chewing practice among dental students

the incorporation of agents such as ginseng, ginkgo, propolis, and guarana into chewing gum.

Dental chewing gum

Fluoride-containing chewing gum

Fluoride-containing chewing gum was proposed early as an alternative to fluoride mouthrinses and tablets for persons with rampant caries and for children living in areas with a fluoride concentration of the drinking water <0.7 mg F/L and no salt fluoridation.^[14-16] Indications for the use of fluoride-containing chewing gum: Children in F-deficient areas; adults with high caries activity and/or reduced salivary flow rate; and patients suffering from enamel erosion. Examples of marketed F-containing chewing gums are Fludent[®], Fluorette[®], Fluogum[®], Sensodyne[®] mit. Fluorid, and Lactalut[®] fluor.

Chlorhexidine (CHX)-containing chewing gum

The use of CHX digluconate as an adjunct to or even as a short-term replacement for mechanical oral hygiene measures is well established. The known disadvantages - namely bitter taste, impairment of taste perception, reversible staining of teeth and tongue, and interaction with surface-active substances such as sodium lauryl sulfate, contained in most commercial toothpastes - however, led to a search for alternatives to the common galenic forms of CHX mouthrinses or gels.^[17] Indications for the use of CHX-containing chewing gum: The proven efficacy and the advantages of CHX-containing chewing gum over CHX rinses - that is, less bitter taste, better oral distribution, less staining, longer oral presence, and convenience of intake clearly make CHX-containing chewing gum a valid choice for persons with a high caries activity, especially for oligosialic (hyposalivary) and xerostomia people. CHX-containing gum is further indicated for patients undergoing periodontal therapy, for example, in initial therapy following scaling and in the maintenance phase, when oral hygiene proves insufficient. CHX gum should also be chewed by persons temporarily unable to perform mechanical oral hygiene for whatever reason.

Enzyme-containing chewing gum

A chewing gum containing lactoperoxidase and glucose oxidase, BioteneO, is marketed claiming "antibacterial action to stop gum bleeding, bad breath, and plaque." No clinical studies with this gum have been published so far, and the claims are based on merely an extrapolation of findings with lactoperoxidase toothpastes, gels, and mouthrinses.^[18] Yotuel, a chewing gum containing the proteolytic enzyme papain (pepsin), which is believed to act as a debriding agent, is marketed as "the whitening chewing gum." No clinical studies supporting this claim are known, but it may be speculated that enzyme-containing chewing gums will become more important in the future due to progress in enzyme synthesis.

Mineral salts in chewing gum

In the 60s, dietary supplements of calcium and phosphate were proposed for the prevention of dental caries. Dicalcium phosphate reduced caries by 90% in hamsters,^[19] and calcium lactate reduced caries in rats.^[20] These findings, however, have never been validated in human trials. Calcium and phosphate supplementation of the diet was assumed to increase the buffering potential and to decrease the demineralization capacity of plaque at the site of the cariogenic challenge.^[21] The incorporation of inorganic neutralizing agents into chewing gum has become very popular. Admixtures used are mono-, di-, and tetra-calcium phosphate, diammonium phosphate, potassium phosphate, and sodium bicarbonate.

Carbamide in chewing gum

A more elegant way to enhance intraplaque acid neutralization, than the use of inorganic salts, is the incorporation of carbamide (urea) into sugar-free chewing gum.^[22] Indications for the use of carbamide-containing chewing gum: Persons with high caries activity; patients suffering from reduced salivary flow; after regurgitation in persons suffering from anorexia nervosa, bulimia, or gastroesophageal reflux; patients with dietary erosions of dental hard tissue; after consumption of acid-containing foods; and after carbohydrate-containing snacks if there is no possibility for mechanical oral hygiene. Carbamide-containing chewing gum is marketed under the trade names V6[®], Dirol[®], and Endekay[®].

Metal salts in chewing gum

Volatile sulfur-containing compounds (VSC) are a major component of bad breath. Zinc acetate, known to reduce VSC levels in the mouth, has consequently been incorporated into chewing gum and tested and found that zinc-containing chewing gum might be a convenient means to fight bad breath.^[23]

To Chew or Not to Chew?

Chewing sugar-containing gum, proven to be cariogenic; hence, it is not advisable to use sugar-containing gums. Sugar-substituted chewing gum, however, can be consumed as a pleasurable product without any risk of caries if the labeled claims are scientifically proven. Such claims include "safe for teeth," "tooth friendly," and "does not promote tooth decay."^[24] Clearly, sugar-free chewing gum has no relevant mechanical tooth cleaning effect, but the saliva stimulated by mastication will effectively dissolve and remove soluble fermentable substrate from the oral cavity, raise plaque pH, and promote remineralization. Thus, the chewing of tooth-friendly chewing gum after meals and carbohydrate-containing snacks is strongly recommended if no mechanical oral hygiene can be performed. The admixture of mineral salts to chewing gum formulations aimed at enhancing

the pH-raising effect of chewing gum has been proven less effective than the incorporation of carbamide for the same purpose. Carbamide-containing chewing gum can be consumed for pleasure alone, but it is also specifically recommended for persons with high caries activity, especially in connection with hyposalivation and in patients with active tooth erosion.^[25] Where indicated, fluoride- and CHX-containing chewing gums are very valuable preventive measures, and the use of chewing gum as a drug delivery system will certainly become more important in the future.

CONCLUSION

The practice of chewing gum among dental students is moderately prevalent and no preference was observed between sugar-free and non-sugar-free chewing

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Source of support: Nil; Conflict of interest: None Declared